In the Claims:

1. (Currently Amended) An electrochemical sensing device wherein analyte-selective organic materials are suspended over a cavity penetrating alternating submicroelectrode layers and insulating layers, analyte selective organic materials being suspended such that they do not come in contact with the submicroelectrodes.

2. (Currently amended) A microcavity device comprising:

(a) a flexible polymer substrate;

(b) integrated, independently addressable electrodes, wherein one of the electrodes is a disk electrode on the substrate and covering the bottom of the microcavity and not used as a reference electrode;

(c) conducting layers connected to said electrodes, said conducting layers being planar and parallel to one another and comprising contact pads;

(d) an insulating layer separating adjacent conducting layers;

(e) said conducting layers and insulating layer being on top of said substrate; and,

(f) at least one microcavity penetrating said conducting layers and said insulating layer, said microcavity having a depth, a diameter and a top opening.

3. (Original) The microcavity device of claim 2 wherein a thin film membrane covers said top opening.

4. (Original) The microcavity device of claim 3 wherein said membrane selectively permits mass transfer across said membrane.

5. (Original) The microcavity device of claim 3 wherein said membrane permits selective mass transfer of an analyte into said microcavity, selectively permits mass transfer of an analyte from said microcavity, and selectively prevents mass transfer of substances which are not analytes into said microcavity.

6. (Original) The microcavity device of claim 2 wherein said height of said microcavity is less than 1 millimeter.

7. (Original) The microcavity device of claim 2 wherein said diameter of said microcavity is less than 1 millimeter.

8. (Original) The microcavity device of claim 2 wherein said electrodes are selected from a group consisting of band electrodes and disk electrodes.

9. (Original) The microcavity device of claim 2 wherein there are at least two electrodes.

10. (Original) The microcavity device of claim 2 wherein a volume of said microcavity is between one femtoliter and one picoliter.

11. (Original) The microcavity device of claim 2, wherein said device includes a plurality of microcavities forming a multiple well array.

12. (Original) The microcavity device as recited in claim 11, wherein said array includes at least 96 wells.

13. (Original) The microcavity device of claim 2, wherein said microcavity device provides at least one electrochemical cell.

14. (Original) The microcavity device of claim 2, wherein said device is a recessed disk microelectrode.

15. (Currently amended) A microcavity device comprising:

(a) a silicon wafer substrate;

(b) integrated, independently addressable electrodes, wherein one of the electrodes is a microdisk electrode on the substrate and covering the bottom of the microcavity and not used as a reference electrode;

(c) conducting layers connected to said electrodes, said conducting layers being planar and parallel to one another and comprising contact pads;

(d) an insulating layer separating adjacent conducting layers;

(e) said conducting layers and insulating layer being on top of said substrate; and,

(f) at least one microcavity penetrating said conducting layers and said insulating layer, said microcavity having a depth, a diameter and a top opening.

16. (Currently amended) A microcavity chemical sensing device, comprising:

(a) a flexible polymer substrate:

(b) integrated, independently addressable electrodes;

(c) conducting layers connected to said electrodes, said conducting layers being planar and parallel to one another and comprising contact pads<u>, wherein one of the electrodes is a microdisk electrode on the substrate and covering the bottom of the microcavity and not used as a reference electrode</u>;

(d) an insulating layer to separate said conducting layers;

(e) said conducting layers and insulating layer being on top of said substrate;

(f) a microcavity penetrating said conducting layers and said insulating layer, said microcavity having a depth, a diameter and a top opening;

(g) wherein said microcavity device is a self-contained electrochemical cell ; and

(h) a device for measuring electrical potential differences or current between electrodes.

17. (Original) The microcavity device as recited in claim 16, further comprising:

(i) a thin film membrane covering said top opening.

18. (Original) The microcavity device of claim 17 wherein said membrane permits selective mass transfer of an analyte into said microcavity, selectively permits mass transfer of an analyte from said microcavity, and selectively prevents mass transfer of substances which are not analytes into said microcavity.

19. (Original) The microcavity device of claim 16 wherein said depth of said microcavity is less than one millimeter.

20. (Original) The microcavity device of claim 16 wherein said diameter of said microcavity is less than one millimeter.

21. (Original) The microcavity device of claim 16 wherein said electrodes are selected from a group consisting of band electrodes and disk electrodes.

22. (Original) The microcavity device of claim 16 wherein there are at least two electrodes.

23. (Original) The microcavity device of claim 16 wherein the volume of said microcavity is between one femtoliter and one picoliter.

24. (Original) The microcavity device of claim 16 wherein said device includes a plurality of micro-cavities forming a multiple well array.

25. (Original) The microcavity device of claim 24 wherein said array includes at least 96 wells.

26. (Original) The microcavity device of claim 16 wherein said device is a recessed disk microelectrode.

27. (Currently amended) A microcavity chemical sensing device, comprising:

(a) a silicon wafer substrate:

(b) integrated, independently addressable electrodes, wherein one of the electrodes is a microdisk electrode on the substrate and covering the bottom of the microcavity and not used as a

reference electrode;

(c) conducting layers connected to said electrodes, said conducting layers being planar and parallel to one another and comprising contact pads;

(d) an insulating layer to separate said conducting layers;

(e) said conducting layers and insulating layer being on top of said substrate;

(f) a microcavity penetrating said conducting layers and said insulating layer, said microcavity having a depth, a diameter and a top opening;

(g) wherein said microcavity device is a self-contained electrochemical cell ; and

(h) a device for measuring electrical potential differences or current between electrodes.

28. (Currently amended) A microfabricated recessed disk microelectrode, comprising:

(a) a substrate;

(b) integrated, independently addressable disk and band electrodes;

(c) conducting layers connected to said electrodes, said conducting layers being planar and parallel to one another and comprising contact pads;

(d) an insulating layer to separate said conducting layers;

(e) said conducting layers and insulating layer[s] being on top of said substrate;

(f) a microcavity penetrating said conducting layers and said insulating layer[s], said microcavity having a depth, a bottom and a diameter; and,

(g) wherein said disk electrode is recessed from the main plane of an insulating layer of the substrate ~~such that it is flush with the bottom of the insulating layer~~ and covers the entire bottom of said microcavity and is not used as a reference electrode.

29. (Canceled) A recessed disk microelectrode, comprising:

(a) a silicon dioxide film grown on a silicon wafer by thermal oxidation;

(b) positive photoresist spin-coated onto said silicon wafer;

(c) a photolithographic mask through which said silicon wafer is exposed to ultraviolet light;

(d) contact leads and microdisk electrodes developed by said photoresist;

(e) a chromium film adhesion layer deposited on said photoresist by thermal evaporation;

(f) said wafer being sonicated in acetone to dissolve the photoresist and to cause lift-off of a metal on top of said wafer;

(g) said wafer being spin-coated wafer with polyimide;

(h) said polyimide being polymerized by exposure to ultraviolet light and cured to cross-link to a polymer thereby formed;

(i) a second chromium layer and a second gold layer deposited on top of said polyimide by thermal evaporation;

(j) a pattern formed by exposing said photoresist to ultraviolet light through a second photolithographic mask;

(l) a covering of gold and chromium which covers electrode lines, with an area over an end of said lines left open for contact; and

(m) a hole formed through said second layer of gold and chromium, and through said polyimide layer to expose said first layer of gold and chromium.

30. (Canceled) The recessed disk microelectrode of claim 29 wherein said silicon dioxide film is two micrometers thick.

31. (Canceled) The recessed disk micro electrode of claim 29 wherein said recessed disk microelectrode further comprises two individually addressable microelectrodes.

32. (Currently amended) A microcavity device for detecting amino acids, comprising:

(a) a silicon wafer to act as a substrate for the microcavity device;

(b) conductor layers;

(c) electrodes connected to said conductor layers<u>, wherein one of the electrodes is a microdisk electrode on the substrate and covering the bottom of the microcavity and not used as a reference electrode</u>;

(d) a polyimide insulating layer to separate <u>said</u> conductor layers; and

(e) a microcavity penetrating at least one electrode and at least one insulating layer<u>,</u> wherein said conductor layers and said electrodes are made of at least one of gold and copper.

33. (Original) The microcavity device of claim 32 wherein a thin film membrane covers said microcavity.

34. (Original) The microcavity device of claim 33 wherein said membrane permits selective mass transfer of an analyte into said microcavity, selectively permits mass transfer of an analyte from said microcavity, and selectively prevents mass transfer of substances which are not analytes into said microcavity.

35. (Original) The microcavity device of claim 32 wherein said microcavity further comprises a depth and a diameter and wherein said depth of said microcavity is less than one millimeter.

36. (Original) The microcavity device of claim 35 wherein said diameter of said microcavity is less than one millimeter.

37. (Original) The microcavity device of claim 32 wherein said electrodes are selected from a group consisting of band electrodes and disk electrodes.

38. (Original) The microcavity device of claim 32 wherein there are at least two electrodes.

39. (Original) The microcavity device of claim 32 wherein the volume of said microcavity is between one femtoliter and one picoliter.

40. (Original) The microcavity device of claim 32 wherein said device includes a plurality of micro-cavities forming a multiple well array.

41. (Original) The microcavity device of claim 40 wherein said array includes at least 96 wells.

42. (Original) The microcavity device of claim 32 wherein said microcavity device provides at least one electrochemical cell.

43. (Original) The microcavity device of claim 32 wherein said device is a recessed disk micro-electrode.

44. (Canceled) An electrode structure wherein exposed surfaces of insulating layers are modified by attachment of chlorosilanes that contain hydroxyl moieties to provide further polar environment on an interior side of the cavity for enhancing bilayer deposition.

45. (Canceled) A structure for three-dimensional microfabricated devices wherein edges of bilayer are anchored by alkanethiol-derivatives attached to the inner edges of Au layers in an etched region of insulator and wherein a bottom of the device is lined with an insulator layer.

46. (New) The device in Claim 2 further comprising adhesion layers between the insulating and conducting layers and the conducting layer and the substrate.

47. (New) The device in Claim 15 further comprising adhesion layers between the insulating and conducting layers and the conducting layer and the substrate.

48. (New) The device in Claim 16 further comprising adhesion layers between the insulating and conducting layers and the conducting layer and the substrate.

49. (New) The device in Claim 27 further comprising adhesion layers between the insulating and conducting layers and the conducting layer and the substrate.

50. (New) The device in Claim 28 further comprising adhesion layers between the insulating and conducting layers and the conducting layer and the substrate.